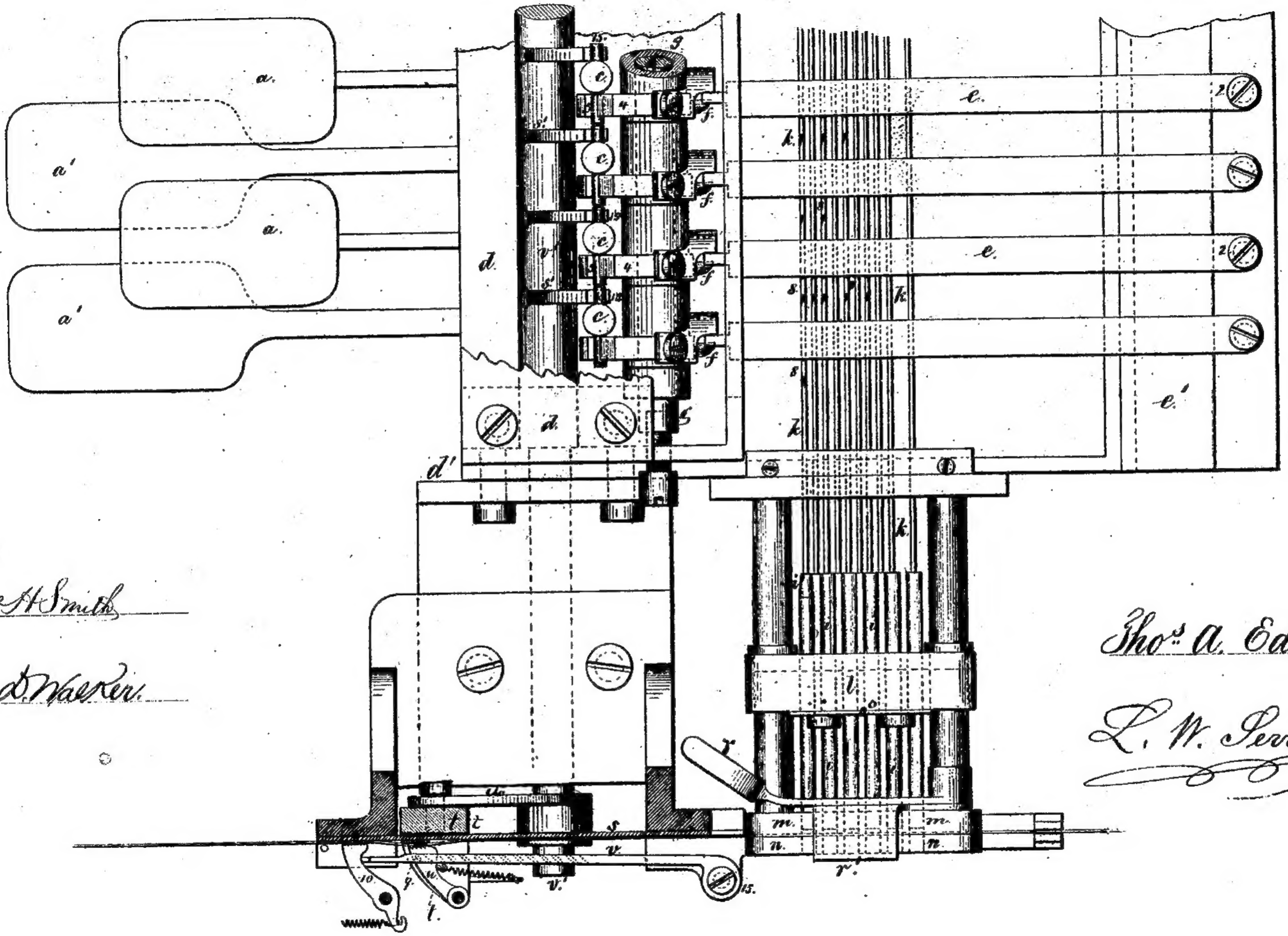
(50.) 3 Sheets--Sheet 1.

THOMAS A. EDISON.

Machinery for Perforating Paper for Telegraphic Purposes.

No. 121,601. Patented Dec. 5, 1871.

Fig. 1.



Witnesses.

Cha. H. Smith

Geo. D. Walker.

Thos. A. Edison,

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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS.)

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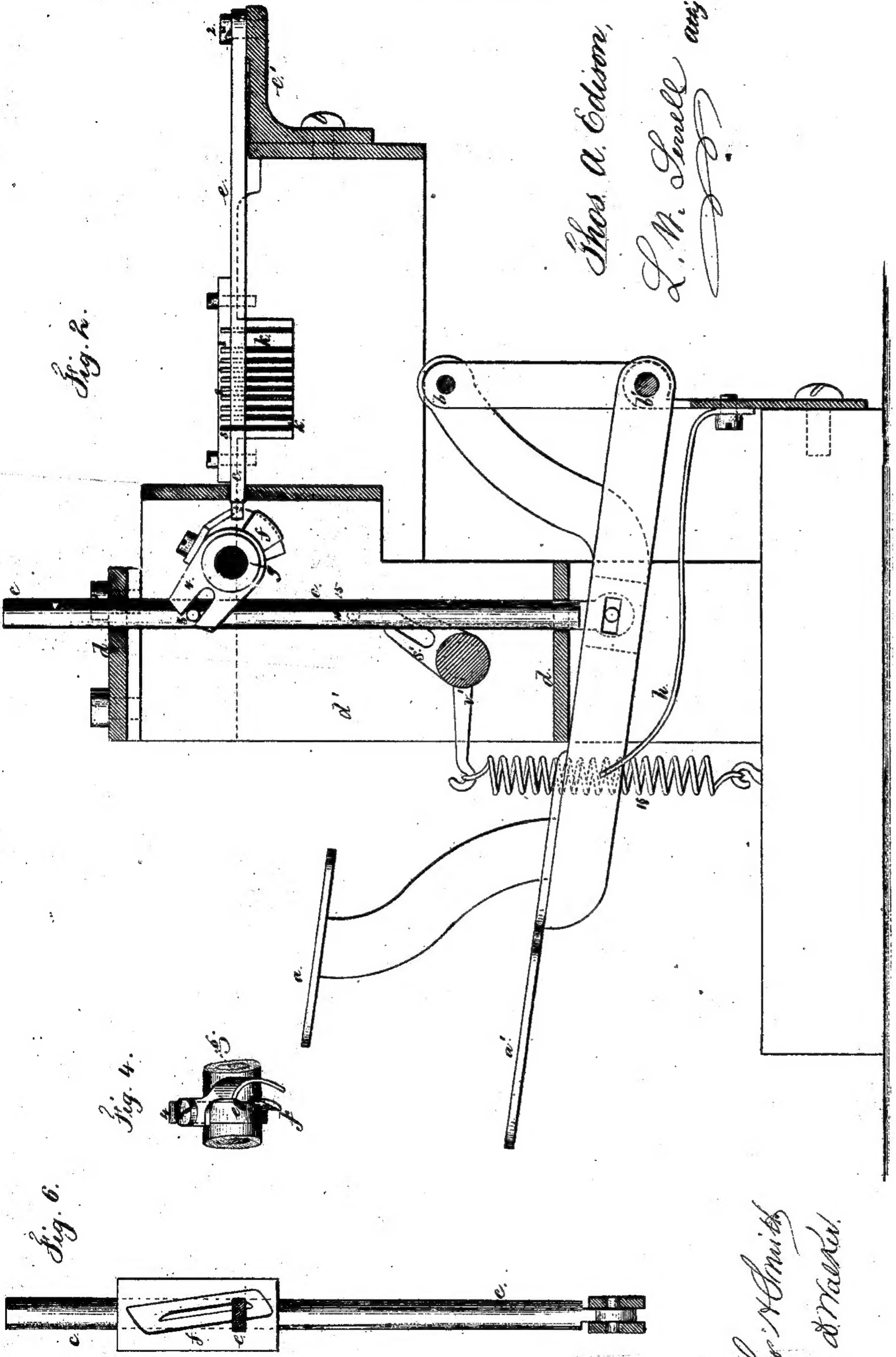

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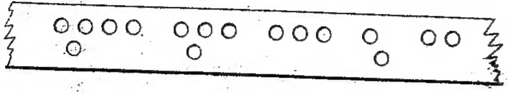


Fig. 3.

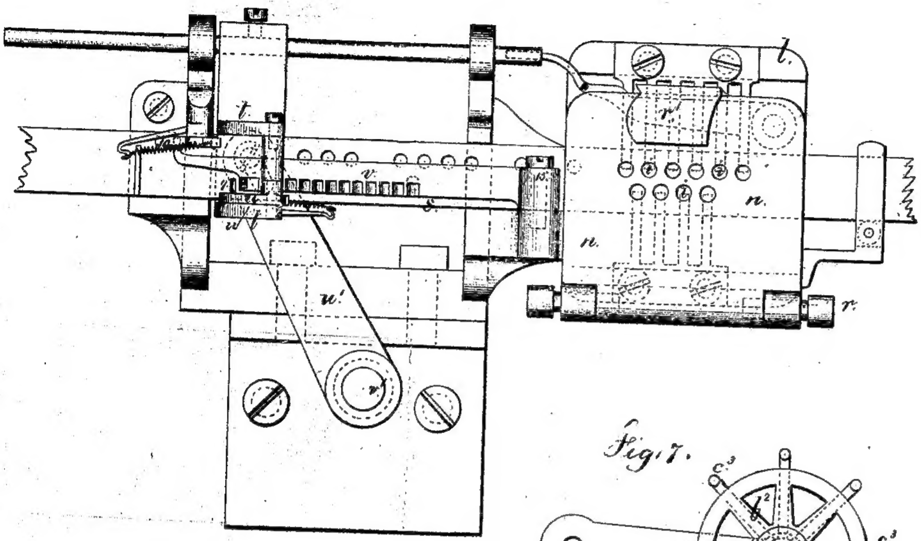


Fig. 7.

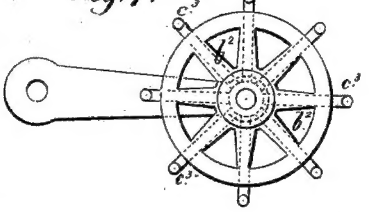
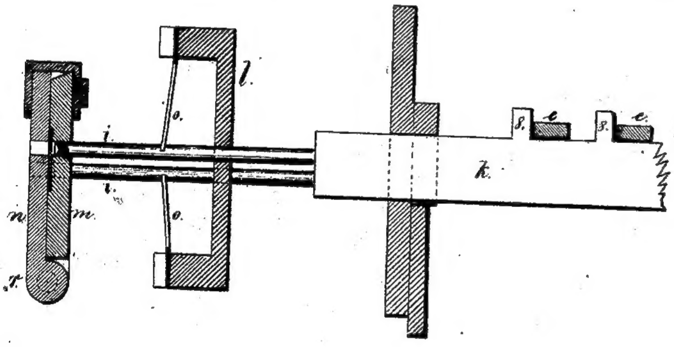


Fig. 5.



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121,601

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY, ASSIGNOR TO HIMSELF AND GEORGE HARRINGTON, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN MACHINERY FOR PERFORATING PAPER FOR TELEGRAPHIC PURPOSES.

Specification forming part of Letters Patent No. 121,601, dated December 5, 1871.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Newark, in the county of Essex and State of New Jersey, have invented and made an Improvement in Perforating-Machinery for Telegraphic Purposes; and the following is declared to be a correct description thereof.

This machinery is for perforating strips of paper employed in transmitting telegraphic messages, the perforations in the paper allowing the circuit to be closed, as heretofore well known. A range of finger-keys is provided, and also a range of slide-plates operating upon punches. A presser-lever is connected by a cam with each finger-key, and contiguous thereto are projections upon such of the slide-plates as are to be actuated by the said finger-key; thereby on striking the finger-key the proper punches are actuated to punch the perforations necessary for the letter complete; and on releasing the finger-key the paper is drawn along the proper distance by a peculiar feeding mechanism, and the perforations are made in two lines, so that where three or more perforations are placed triangularly a long pulsation may result from the metallic connection being made through those perforations successively, the contact being made through the second perforation before ceasing through the first, and so on.

In the drawing, Figure 1 is a plan of a portion of the instrument with the paper-feed in section. Fig. 2 is a vertical section at the finger-keys. Fig. 3 is an elevation of the paper-feed and dies. Fig. 4 is a separate view of the cam that actuates the presser-lever. Fig. 5 is a cross-section of the punches and dies, and Fig. 6 is a modification of the device that connects the finger-key and presser.

The finger-keys *a a* are mounted upon a fulcrum-shaft, *b*, and the second range of keys *a'* swing on the shaft b^1, this arrangement facilitating the construction and allowing the keys to be arranged compactly, and at the same time they are convenient for fingering. The vertical bars *c c* slide in supports *d*, and are jointed at their lower ends to the keys *a a'*, or otherwise connected. These supports *d* form part of a frame, with end pieces *d'* that inclose the key-levers and connected parts, and also sustain the shaft *v'* that is employed for actuating the paper-feed, the paper and mechanism that act upon the same being outside the end piece *d'* of said frame. The presser-levers *e e* are connected by screws or pins 2 on the frame or bar *e'* so as to swing horizontally, and are each actuated by a cam, *f*, upon the bar *c*, as in Fig. 6; or by a swinging cam upon a sleeve surrounding the stationary bar *g*, as shown in Figs. 1, 2, and 4; said swinging cams being provided with jaws 4, in which the pins 5 of the bars *c* slide as the latter are depressed by the finger-key. These cams *f* are shaped so as to give a definite movement to the levers *e* and slide-plates *k* sufficient to operate the punches, and then the levers *e* are relieved to allow the springs of the punches to throw them back out of the paper, the presser *e* and punch or punches being operated as the key is depressed, and as the key is relieved the movement of the cam *f* in the other direction insures the drawing back of the presser-lever *e*. Each finger-key is raised by a spring, *h*, and there are to be as many finger-keys and parts operated by each as there are letters or separate characters employed in telegraphing. Beneath these pressers *e* are the slide-plates *k k*, corresponding in number to the punches employed. The punches *i i* are round steel rods sliding in the heads *l m* and acting against the dies *n* to punch the paper that is introduced between *m* and *n*, and the rear ends of these punches should be made smaller, as shown at *i'*, in order that there may be room for the ends of the slide-plates *k* to pass between the adjacent punches and only act upon its own punch. The ranges of springs *o* enter notches in the punches *i* and throw the punches back, and the punches are positioned in two lines, as seen in Fig. 5, the distance between the punches being less than the diameter of the punch, and the punches of the upper range are above the spaces between the lower punches; thereby, if three contiguous punches are simultaneously actuated, the perforations will be equivalent to a dash, and cause a long pulsation from the transmitting instrument and produce a dash at the receiving instrument. Upon the slide-plates *k* are projections 8, contiguous to the pressers *e*, and these projections 8 are to be upon only such of the slide-plates as are required to be moved by the presser to which they are contiguous, so that only those slides will be moved upon depressing a finger-key that operates the punch or punches that make the perforations for the corresponding character; hence the necessary perforations can be made in the strip of paper for composing the message by dots and dashes, the dashes at the receiving station being of any desired length, according to the number of consecutive perforations in the two lines of perforations made in the paper.

By this arrangement any desired character of alphabet or code of signs can be adopted within the scope of the instrument: and I remark that the number of punches may be increased at pleasure, and also the number of finger-keys.

By boring the holes in l m n for the punches all at the same time they will all be properly in line with each other, and the punches i, being round parallel wires notched for the ends of the springs, are easily made or replaced. The cutting end of each punch is to be a conical or concave hole, and the sharpening is to be effected by deepening this hole by a proper tool. These punches will cut the paper with less power and more reliably than the flat-ended punches heretofore used.

The parts m n are to be hinged together at r to allow the die-plate n to be swung open in removing any obstruction. The clip r' holds the die in place when shut. The paper-carrier t is moved back toward the punches i each time a finger-key is depressed, and during the time that the paper is being punched and the feed takes place as the key rises. The backward movement is to be the distance required for the character that is simultaneously punched. The mechanism for giving this motion may be of any suitable kind. The device which I employ for this purpose is next described.

A rack-bar, r, swinging upon the screw 15, is provided, and in the lower edge are inclined or cam-shaped teeth, and upon the carrier t is a pawl, u, with an inclined finger, 9; hence as the carrier t is moved back the pawl u is lifted from the paper by finger 9 turning upon the teeth of the rack-bar r, and the carrier and pawl can be moved back any required distance and the paper remain unacted upon, and is held by the spring-pawl 10; but as soon as the carrier t commences to move in the other direction the inclined finger 9 slips into the first opening between the inclined teeth of the rack-bar, allowing the end of the pawl u to approach the paper and clamp it against a thin carrier-plate on t that is in front of the fence s, and as the carrier t moves along the paper is drawn through between m and n until the carrier t reaches its extreme movement and the finger 9 clears the last tooth on the rack-bar r. During this movement the pawl 10 has been entirely raised from the paper by the end of the rack-bar r acting thereon while the finger 9 has traveled between said rack-bar and the paper. It will be thus seen that the paper is very firmly held while being moved, and that there is nothing that is moving in contact therewith and tending to injure the paper as the carrier draws back, and that the feeding motion can be to any desired extent. The motion given to the sliding carrier is shown as derived from the rock-shaft r' and arm u'. Upon the rock-shaft r' are forked cams s', contiguous to the slide-bars c. The pins 15 on the slide-bars c enter the fork as the keys are depressed and give the required motion to the rock-shaft to move the sliding carrier back. The spring 16 acts to move the paper forward as the key rises. By positioning the pin 15 higher up or lower down it will be brought into action later or sooner in the movement of the key, and hence move the carrier t to a greater or less distance, and the amount that is required for the character or letter perforated by the depression of that key.

It will be apparent that when a key is struck the appropriate punches will be operated and instantly retracted, and that simultaneously the carrier and paper-feeding mechanism will be thrown back without acting on the paper. The inertia of the parts will carry the slide t slightly further back, and the spring u brings it forward before the key is relieved sufficiently for the finger 9 to enter between the teeth of the rack-bar and place the parts ready to move the paper as the key is liberated. The movement given to the paper-feed is fourfold: First, it is relieved; second, it draws back clear of the paper; third, it comes upon the paper and clamps it; and fourth, it moves with the paper. The paper is drawn along suddenly as the feed takes place; hence the paper-reel is suddenly moved and the paper thrown off the reel in a bow or loop. I construct my roller so as to prevent this occurrence. The reel b^2, Fig. 7, is made in the usual manner and mounted upon a vertical axis, and around the base of the reel I provide vertical projecting pins c^3, close to but not touching the said base of the reel, so that upon the sudden rotation of the reel the paper coil will be thrown out but cannot pass beyond these pins; thereby the paper will be held in place, and will draw off easily to the perforating-machine, as required.

The transmitting-machine is to be provided with a wire or spring brush to close the circuit through the perforations; and if the end of this brush were diagonal the long pulsation would be produced from the two lines of perforations even if the perforations were nearly in line transversely of the strip of paper.

I claim as my invention—

1. Two ranges of punches for perforating telegraphic paper with holes representing dashes, or dashes and dots, substantially as set forth.

2. A strip of telegraphic paper perforated in two lines, with the perforations arranged so that the long pulsation in transmitting is obtained from perforations in both lines, substantially as set forth.

3. A series of perforating-punches arranged in two or more lines and supported in heads that are perforated in the line of the opening in the die, substantially as set forth.

4. The die-plate n, hinged so as to be opened, in combination with the punches, for the purposes set forth.

5. The springs o combined with the punches i, and arranged in the manner specified to retract the punches from the die-plate n, as set forth.

6. The combination of the sliding punches and sliding plates *k* with the actuating-levers *e*, substantially as set forth.

7. The punches *i* reduced at the end next the slide-plates *k*, for the purposes set forth.

8. The finger-keys *a a′*, in combination with the bars *c*, slide-plates *k*, and levers *e*, substantially as and for the purposes set forth.

9. Mechanism actuated by one movement of a key, substantially as specified, for punching in two rows telegraphic characters consisting of dots and dashes.

10. The finger-keys, cam-rods, levers, and cams arranged between the frames *d′*, in combination with the punching and feeding mechanism operating upon the strip of paper running parallel or so with the finger-keys, as set forth.

11. The paper-feeding mechanism having a reciprocating movement of varying length, according to the character perforated, and acting to grasp the paper and carry the same forward, but not to catch or hold such paper on the return movement, substantially as set forth.

12. The paper-feeding clamp *t* moving upon the slide *s*, in combination with the pawl *u* and mechanism for reciprocating such clamp, substantially as set forth.

13. The rack-bar *v* with inclined teeth, in combination with the pawl *u* and finger 9, substantially as and for the purposes set forth.

14. The holding-pawl 10 operated by the rack-bar *v*, substantially as set forth.

15. The clamp *t*, pawl *u*, and fence *s*, in combination with the rack-bar *v* and pawl 10, substantially as set forth.

16. A reciprocating paper-feed in which the clamping device is lifted off the strip of paper on the backward movement and pressed upon the same on the forward movement, substantially as set forth.

17. The combination of a reciprocating paper-feed with finger-keys that operate the punches, and with mechanism connecting the said finger-keys to the paper-feed in such a manner that the movement given to the paper will be the amount required for the letter or character perforated, substantially as set forth.

18. The slide-rods *c*, pins 15, and cam-fork *s′*, in combination with the rock-shaft *v′* and reciprocating paper-feed, substantially as set forth, for varying the feed according to the position of the pins 15 or their equivalents.

19. In an instrument for punching paper for telegraphic purposes, a series of cams each adapted to operating the mechanism that moves the punches and then releasing such punches during the downward movement of the key, substantially as set forth, so that said punches may be out of the paper before the feed takes place.

20. The paper-reel in combination with the surrounding stationary pins contiguous to the base of the reel, for the purposes set forth.

Signed by me this 16th day of August, A. D. 1871.

T. A. EDISON.

Witnesses:
CHAS. H. SMITH,
HAROLD SERRELL.

(109)